BETWEEN LAND AND SEA: TELL MIRHAN AND THE CHEKKA REGIONAL SURVEY. PRELIMINARY REPORT OF THE SURVEY AND FIRST EXCAVATION SEASON (2016–2018)

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Abstract: *In 2016 the Institute for Oriental and European Archaeology (OREA) and the Department for History and Archaeology at the American University of Beirut (AUB) launched a new archaeological project in the Chekka region in Lebanon. The Chekka region borders the shore of the Mediterranean and is situated between Batroun in the south and Tripoli in the north. At the northern end of the modern town of Chekka directly at the seashore one finds the remains of Tell Mirhan on the premises of a modern cement factory (Fig. 1).*

This tell and its hinterland have never been the subject of a thorough and systematic archaeological investigation. A survey conducted at Tell Mirhan in 2016 and an excavation in 2018 revealed an early Iron Age occupation (1200–700BC) superimposing a massive rampart fortification of the Middle Bronze Age. Egyptian pottery from the Middle and New Kingdom as well as imports from Cyprus and Greece testify to the importance of this site as a harbour town during these periods.

In order to investigate the site's relation with its hinterland, a survey of the region from the coast into the foothills of Mount Lebanon was launched. To cope with a rather difficult terrain and intensive modern construction activities and changes of the ancient landscape, we conducted a LiDAR scan of the survey area in November of 2018.

Keywords: *Tell Mirhan, Lebanon, Chekka Regional Survey, Bronze Age, Iron Age,*



Fig. 1 Map of the Chekka Region, the plateau of Amioun and the site of Tell Mirhan (after: Google Earth image ©2019 Digital Globe, Image©2019 CNES/Airbus)

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Lebanon was a key partner in the maritime trading network along the eastern Mediterranean for thousands of years. This part of the Levant not only produced and provided important and desired goods, it also acted as an intermediary for the exchange of commodities, technologies and ideas between the Fertile Crescent and the Mediterranean, on the one hand, and Anatolia and Egypt, on the other. It is along the coast where this exchange is best detectable. Sites such as Tell Arqa[4] in the north, Tell Koubba,[5] Fadous-Kfarabida,[6] Byblos[7] and Beirut[8] on the central Lebanese coast, and Sidon,[9] Tell Burak,[10] Sarepta[11] and Tyre[12] in the south all provided evidence of this exchange during the Bronze and Iron Ages (IA). The Lebanon Mountains provide a natural watershed, with all the rivers and wadis on its western side flowing into the Mediterranean. Many of the sites were established at natural harbours, ideally where these rivers or wadis flowed into the sea or near to them. This is certainly the case for most of the major centres, such as Tripoli (Abu Ali river), Byblos (between Nahr el-Joura and Nahr el-Fidar),[13] Beirut (Beirut river),[14] Sidon (between Nahr al-Awali and Sayniq River) and Tyre.[15] All these sites are situated at a distance of 35−40 km from each other.[16] During the Bronze Ages, there were smaller places at shorter distances (up to 12 km) from the major centres, such as the sites of Arde[17] and Nahr Bared near Tripoli, Fadous-Kafarbida near Byblos and Tell Burak near Sidon.[18] And then there are sites that are positioned more or less equidistant between these major centres, such as Tell Arqa near Tripoli, and Sarafand between Sidon and Tyre.[19] The site of Tell Mirhan is such an "in-between" site. It lies about 15 km south of Tripolis and 25 km north of Byblos.

The vicinity of Tell Mirhan in the Chekka region is defined topographically by a small flat coastal strip with an abrupt uprising mountain range belonging to the foothills of Mount Lebanon. This area is characterized by valleys deeply carved into the extending inland, carrying small rivers and seasonal streams down towards the sea. The southern part of the coastal strip is limited by a precipitous mountain plateau (Ras Chekka) forming a natural bay with a long extended coast to the north. Regarding the geological conditions, the entire Chekka region is dominated by chalk and limestone formations. The Senonian marls and chalks, especially, have an impressive thickness of up to 500 m at Chekka, thus, this geological setting is termed 'Chekka formation'.[20] Nowadays, the 'Chekka marls' are used for cement production by several plants in this region due to their quality. Moreover, the chalk/marl formation contains numerous bands and nodules of siliceous precipitations, particularly chert or siliceous limestone. Sandstone, marine limestone and calcarenite are situated as bedrock underneath dunes and fluvial deposits directly along the coast.

Archaeologically speaking, hardly anything is known about the region between Ras Chekka in the south and Enfeh in the north and its hinterland up to the timber line of Bcharre. Besides the sites of Beit Chlala and Chatine[21] in the Wadi el-Jouz, where pottery of Late Bronze Age (LB) and IA has been picked up, only Palaeolithic, Roman and Medieval remains are known so far. The landscape in this region has changed considerably over the centuries. The forces of nature and the gradual cutting of the forests already in antiquity have led to changes in the morphology of this area. However, the whole area has changed dramatically in the last 50 years. This ancient cultural landscape, now dominated by two large quarries for the production of cement in the foothills behind Chekka, has additionally been endangered by the construction

4 Thalmann 2006.
5 Badreshany et al. 2017.
6 Genz 2014.
7 Montet 1928; Dunand 1937, 1939, 1950, 1958, 1968, 1973; Lauffray 2008.
8 Badre 1997.
9 Marriner 2007.
10 Kamlah and Sader 2019.
11 Pritchard 1978, 1988; Koehl 1985; Anderson 1988; Khalifeh 1988.
12 Bikai 1978; Aubet et al. 2016.
13 Francis-Allouche and Grimal 2016, Fig. 3.
14 Carayon et al. 2011, 52, Fig. 9.
15 9 km north of the city lies the Litani river. However, like in the Sidon region, there are freshwater springs along the coast, which provided fresh water to the site; see Ghannam et al. 1998, 282.
16 This would be equivalent to a two-day march on foot from one centre to another for an untrained person and the distance a donkey can walk in one day with medium carrying weight; see Förster et al. 2013, 208.
17 Salamé-Sarkis 1972.
18 These are distances one can walk in a not too difficult terrain within 2–3 hours.
19 They are at an average of about 20 km from the major cities and would equal a day's journey.
20 Walley 1997.
21 Noth 1956, 75.

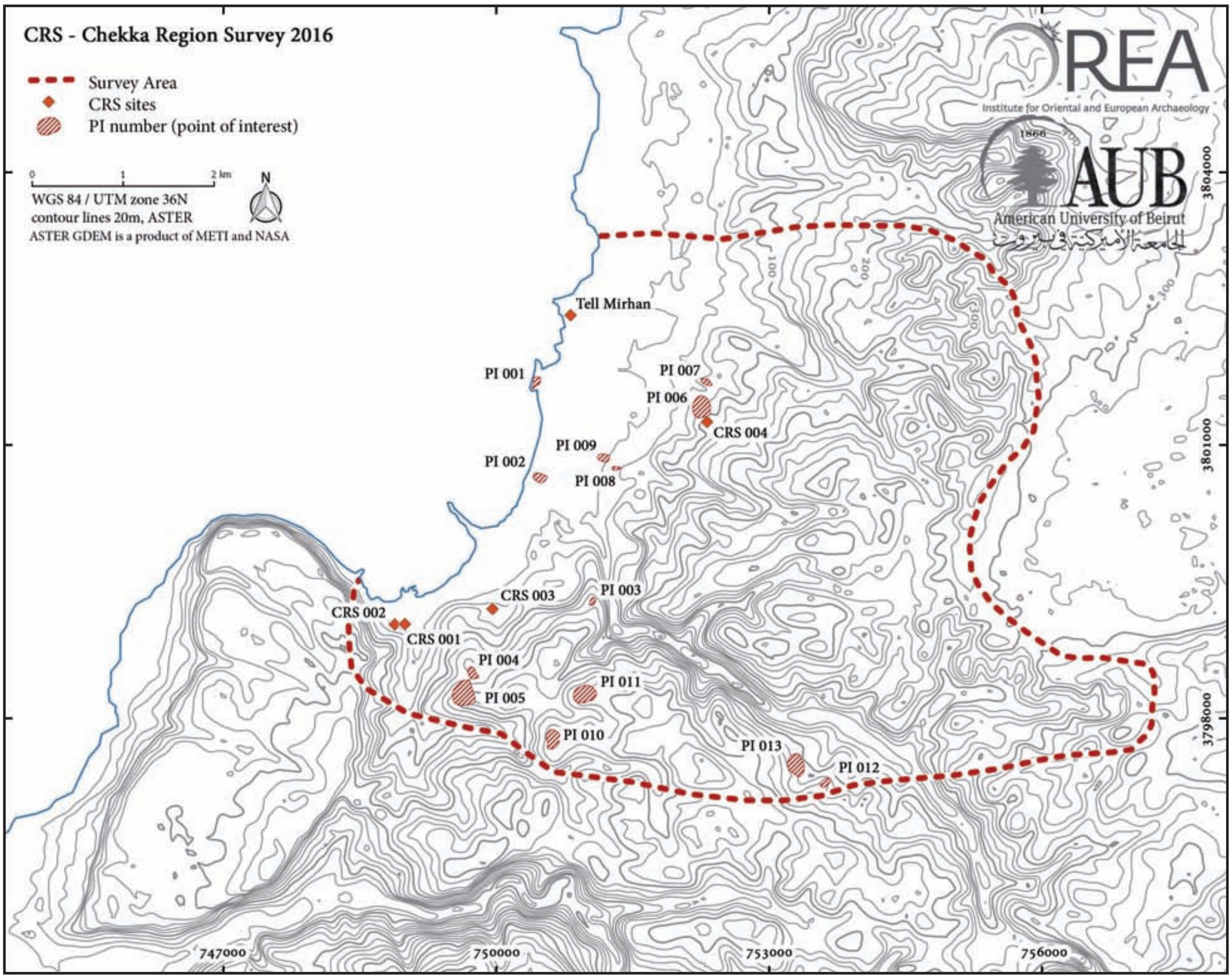


Fig. 2 Sites visited during the survey 2016 (©OREA & AUB, graphic M. Börner)

of modern houses and terraces for olive groves since the late 1990s. In 2018, a large dam was constructed next to the highway from Batroun to Chekka at the southern foot of Ras Chekka to collect the waters of the Nahr el-Jouz river system.

Research in Northern Lebanon was undertaken previously only north of Tripoli at Tell Arqa (Early Bronze Age (EB) – Islamic)[22] by Jean-Paul Thalmann, and Karin Bartl conducted a survey in the Akkar plain.[23] Hassan Salamé-Sarkis made some small soundings at Arde in 1972, where he found Middle Bronze Age (MB) layers.[24] Therefore, a new project was launched in 2016 to survey the area between the Bay of Chekka and Bcharre. The aim was to gain new insights into the archaeology of Northern Lebanon, an endeavour that is shared by our colleagues from the Balamand University, who have worked directly north of our survey area in the Enfeh regional project since 2011.[25] The Batroun Hinterland Survey,[26] bordering our region to the south, was initiated in 2016 in co-operation with the Koubba Coastal Survey.[27] The Northern Lebanon Project, a joint project of the University of Udine and the Lebanese University – Third Branch Tripoli with the scientific participation of the IFPO Beirut, directed by M. Iamoni and M. Haider, has been active on the Koura Plain and in the modern cities of Amioun and Koura since 2017.

Field survey in summer 2016 (25 July–7 August 2016):

Participants:

Prof. Hermann Genz – project and field director (AUB)

Dr. Karin Kopetzky – project and field director (OREA)

Dipl. Ing. Mario Börner – excavation technician, surveyor (OREA)

[22] Thalmann 2009.

[23] Bartl 1998-1999, 2002; Bartl and Chayaa 2002.

[24] Salamé-Sarkis 1972, 1973.

[25] Panayot-Haroun 2015; 2016.

[26] McPhilips et al. in press.

[27] Bradbury and McPhilips, oral communication.

Mahmoud Mardini, BA – student
Christoph Schwall, M.A. – archaeologist, geology (OREA)

During the two-week field survey in summer 2016, work focused on the coast of Chekka, al-Heri southeast of Tell Mirhan, and the foothills rising east of the modern city of Chekka (Fig. 2). In a first step, 'Points of Interest' (PI) were identified either due to their visual dominance in the landscape or via studying the geography of the area on Google Earth. In a second step, these points were visited and surveyed by fieldwalking to find any architectural remains in the landscape and collect pottery and small finds if possible. The



Fig. 3 CRS001, a terraced olive grove (©OREA & AUB, photo M. Börner)

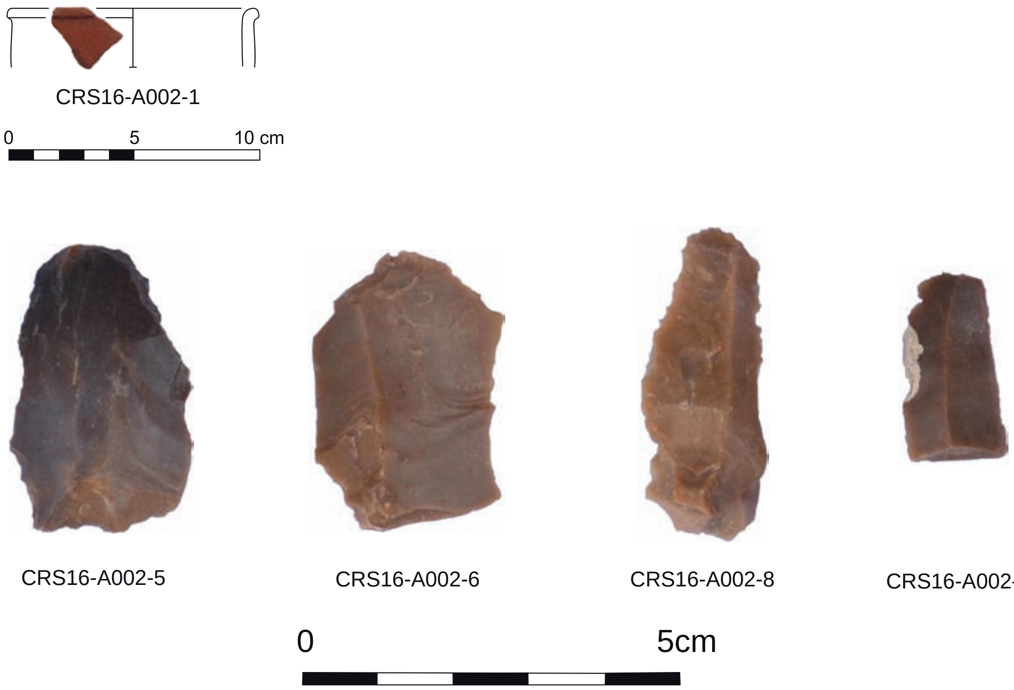


Fig. 4 Roman pottery and flint material collected at CRS001 (©OREA & AUB, photo M. Mardini, graphics S. Fragner)



Fig. 5 CRS002, south of CRS001, destroyed by a large bulldozer cut (©OREA & AUB, photo M. Börner)

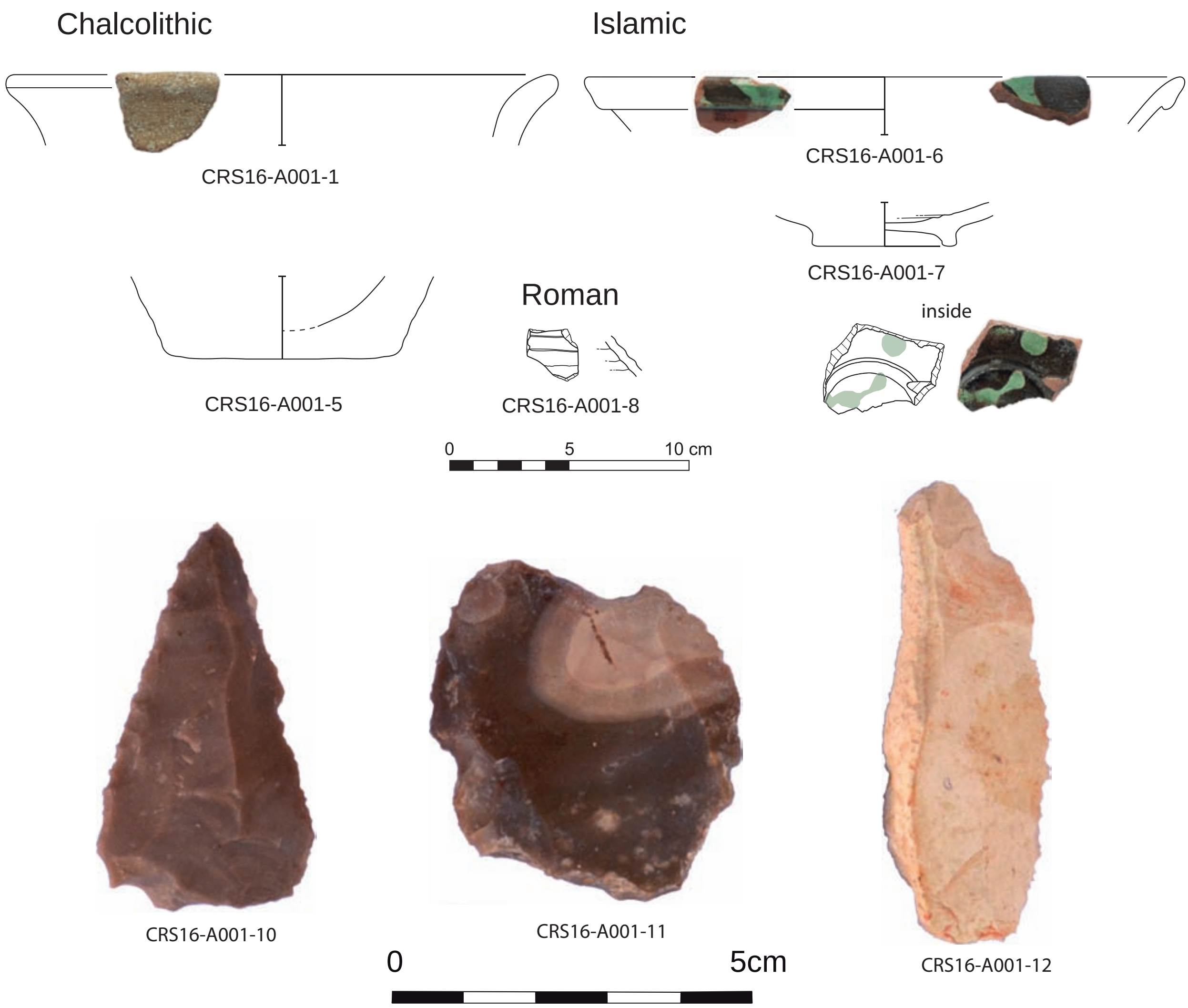


Fig. 6 Pottery and flint material collected at CRS002 (©OREA & AUB, photo M. Mardini, graphics S. Fragner)

challenges one is facing in this area became obvious very quickly. Most of the land along the coast is either overbuilt or heavily altered by construction activities and hardly anything of the original coastline is preserved. The areas that are still accessible, however, are densely covered with vegetation, whether it is reed or maquis. So far, seventeen PIs have been investigated of which four (CRS: Chekka Regional Survey) have yielded archaeological remains and material.

CRS 001 (B: 34.302694°; L: 35.705875°) (Fig. 3)

The sites CRS001 and CRS002 are about 1 km northeast of the tunnel under Ras Chekka on the old coastal road from Batroun to Chekka, where the cliff stops and the street turns into al-Heri, on the right side of the road and about 100 m to the east. CRS001 rises 10 m above today's road level. This small hill, consisting of white Chekka marl, was probably originally a site but through recent intensive terracing most of it was removed. Roman pottery[28] and lithic material (Fig. 4) were collected only at the edges of the northern slope. No traces of occupation layers were preserved. We climbed up to a small ridge south-east of CRS001 overlooking the latter on the northern slope of Ras Chekka, but no evidence of human activity was found there.

CRS002 (B: 34.302794°; L: 35.704471°) (Fig. 5)

Lithic material and pottery from the Chalcolithic, Roman and Islamic periods (Fig. 6) were collected about 100 m south of CRS001 along a modern bulldozer cut. It is not clear whether this site was originally part of CRS001.

CRS003 (B: 34.303944°; L: 35.716093°) Tell Heri (Fig. 7)

The site of al-Heri lies on a natural round limestone hill at the entrance to Chekka, on the right side of the modern highway to Tripoli. Today, the hill is terraced and half of the site is covered by a modern house, while the other half and the terrac-



Fig. 7 View at Tell el-Heri (CRS003) from the foothills in the east (©OREA & AUB, photo M. Börner)

[28] The Roman material will be studied by Bettina Fischer-Genz.



Fig. 8 CRS004, rock-cut chamber tomb destroyed by the construction of a modern street (©OREA & AUB, photo H. Genz)



Fig. 9 CRS004, looted rock-cut chamber tombs (©OREA & AUB, photo H. Genz)

es are planted with olive trees. This tell is a multi-period site of about 25,000 m² and revealed material dating from the Chalcolithic to modern times.

CRS004 (B: 34.321461°; L: 35.7421972°)

This site is located on a projecting rock plateau where the foothills of the Koura-Amioun plain slope down to the sea. During the construction of a road through these foothills for modern housing, caves were discovered (Fig. 8), which are probably the remains of rock-cut tomb chambers. Their date remains unclear due to the lack of any finds. A round open shaft and the side chamber of a recently looted tomb were found nearby (Fig. 9). Only the rim fragments of an EB platter (Fig. 10) were left behind next to the tomb. A second rectangular shaft of another empty chamber tomb was detected one metre to the north. Despite an intensive search, there were no other rock-cut tombs discovered in the vicinity.

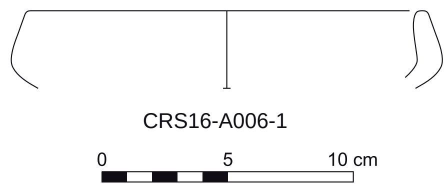


Fig. 10 Fragment of an Early Bronze Age platter from a looted rock-cut chamber tomb (©OREA & AUB, graphics S. Fragner)



Fig. 11 PI001, man-made shallow round and rectangular basins, probably for the production of salt (©OREA & AUB, photo M. Börner)



Fig. 12 PI010 basin for the production of grape-molasses (©OREA & AUB, photo M. Mardini)

In addition to the sites mentioned above, we visited twelve more places which we found of interest due to their geographical position.

PI001 (B: 34.326344°; L: 35.722169°) (Fig. 11)
This place is right at the beach, about 900 m south of Tell Mirhan, and is partially covered with water when the tide comes in. It shows man-made rectangular and round basins with diameters up to 1.5 m and depths of about 10 to 20 cm, which seemed to be shallow pans for salt production. However, no specific dating for their construction can be given yet. The production of salt has a long tradition in this region, as the studies of N. Panayot-Haroun on the promontory of Enfeh showed.[29]

PI002 (B: 34.316722°; L: 35.722155°) turned out to be a modern dumping ground next to the seashore 1.9 km south of Tell Mirhan.

PI003 (34.304483°; L: 35.728011°) is a North-South running ridge overlooking the whole Bay of Chekka with an excellent view to the north and a perennial river connecting the coast with the Amioun plateau. No archaeological features or finds were discovered there.

PI004 (B: 34.297719°; L: 35.713363°) and PI005 (B: 34.294961°; L: 35.712775°)

[29] Panayot-Haroun 2015, 396.

From PI003, the road leads through the modern village of Kefraya to PI004 and PI005. PI004 is a flat plateau consisting of Chekka marl overlooking the coastal plain. Directly south of it is a natural hill PI005, which has been massively remodelled by modern terracing in the last five years for the plantation of an olive grove.

PI006 (B: 34.323491°; L: 35.741586°) is a protruding limestone plateau, which turned out to be without any archaeological traces.

PI007 (B: 34.325658°; L: 35.742458°) was observed from PI006 but turned out to be an overgrown modern rubbish heap.

The same holds true for PI008 (B: 34.317533°; L: 35.730977°), which is west of the Beirut-Tripoli highway, and turned out to be the construction dump of the nearby Air Liquide factory.

PI009 (B: 34.318444°; L: 35.729600°) is located about 150 m further north-west and was partially in a field as well as in an olive grove. It yielded one ring base of an open shape with a yellow glaze inside.

PI010 (B: 34.289333°; L: 35.722588°) and PI011 (34.295200°; L: 35.726855°) are two hilltops situated north and south of the wadi connecting the modern villages of Kefraya and Bednayel. PI010 is the southern plateau, where a rectangular rock-cut basin was discovered at its southern end in the garden of one of the modern houses. This was used in the past (some two generations ago) for the production of grape molasses, according to its owners (Fig. 12). The earth of the garden of this house contained ancient pottery, but it turned out that the earth had been brought by the owner from somewhere else to the site. PI011 was visited north of the road between the two villages and north-northeast of PI010. It turned out to be a limestone hill offering a spectacular view to the south and to the west but without any traces of ancient use.

PI012 (B: 34.285758°; L: 35.755005°) lies about 600 m north-east of the modern village of Kfar Hata and proved to be a heavily terraced hill with olive groves without any traces of ancient activities.

Tell Mirhan (B: 34.333451°; L: 35.726247°)

Tell Mirhan lies directly on the shore of the Mediterranean between the promontory of Enfeh in the north and al-Heri in the south, at the northern end of modern Chekka. The tell is in the centre of a small coastal strip of flat land before the foothills of mount Lebanon rise at a distance of 1.5 km to the east. Numerous large and small rivers and wadis flow into the Chekka Bay. Two of them pass the tell at its northern and southern end, with the northern one bearing water the whole year round. An old corona image shows an oval-shaped tell (Fig. 13), which was cut in half by a modern road. This cut happened between 1953 when a cement factory was established at the site, and 1968 when this satellite image was taken. This E–W cut was for the construction of an oil pipeline to provide the fuel for the factory's kilns. A small jetty for oil tankers was probably built at the same time. The image shows that parts of the southern end of the tell were overbuilt with several modern houses, but otherwise the site was well-preserved. Since then, 98 % of the original tell has been levelled or terraced by the cement factory and the surrounding private houses and gardens. It seems that the site once had a north-south extension of 350 to 400 m and an east-west extension of 150 to 200 m. With a possible size of between 4 to 6 ha (10–15 acres/40–60 dunams), this tell rivalled Bronze Age cities such as Sidon and Byblos. Copeland visited the site in 1966 and remarked on the road and the jetty. She and Roger Saida picked up EB and MB pottery and some later sherds, including LB pottery.[30] James Pritchard mentioned in 1978 that a large part of the site was destroyed and only an area of 20 by 30 m was preserved.[31] Both are speaking of a small tell in their descriptions.



Fig. 13 CORONA satellite image 1105-2267F025 taken on 20. November 1968

[30] Copeland and Wescombe 1966, 161.

[31] Pritchard 1978, 11.

Today, only a very small part of about 1,000 m^2 is still preserved in the south western part of this site. After removing the modern dump on the top of the tell, this remaining part stands at a height of about 7 m above sea level.

Our work on the site started in the summer of 2016 when we conducted a survey and mapping of the site and cleaned the southern section of the large E–W cut through the tell.

The pottery, which we picked up on the top of the tell, contained a few EB sherds and mainly MB pottery, some LB/IA sherds, Egyptian pottery, grinding stone fragments and less than a handful of Roman, Islamic and modern pottery. The next step was to clean and document the preserved southern section of the large E–W cut to a length of 34 m. After one week's work we had revealed a massive rampart system typical of the MB and smaller walls belonging to later periods to the west of it outside the rampart.

The rampart was constructed with a central core wall of limestone and beach rock, 1.6 m wide and preserved to a height of 2.7 m (Fig. 14).[32] Abutting on each side of this wall were the different layers of the rampart at an angle between 20° and 25° in order to consolidate this construction. Retaining walls were built inside the rampart to prevent the various layers from sliding or getting washed away by the torrential rainfall during the winter months. The earth material used for this rampart was obviously carefully chosen, especially for the part west of the core wall, where more of a dark brown compact loamy material was used, with hardly any stones or settlement material. The layers on the inner side of the rampart contained much more pottery and were less compact. Squeezed-in sandy layers probably served to drain the construction. The fact that these different layers must have needed time to settle and stabilize speaks for a longer construction period, so do the washed-in lenses of weathered sand- and limestone.[33] These might have been brought by the wind or were more likely washed down from the central stone wall. These lenses are indicators of the length of time that was needed to construct such a rampart.

The large section shows that the upper part of the MB fortification system was cut away, probably during the IA, leaving only the core wall behind of what was once very likely the stone



Fig. 14 Southern section of the large E–W cut through Tell Mirhan in the summer of 2016 (©OREA & AUB, graphic M. Börner)

[32] For this type of construction, see also Burke 2008, 54.

[33] We would like to thank R. Banerjea for this information.

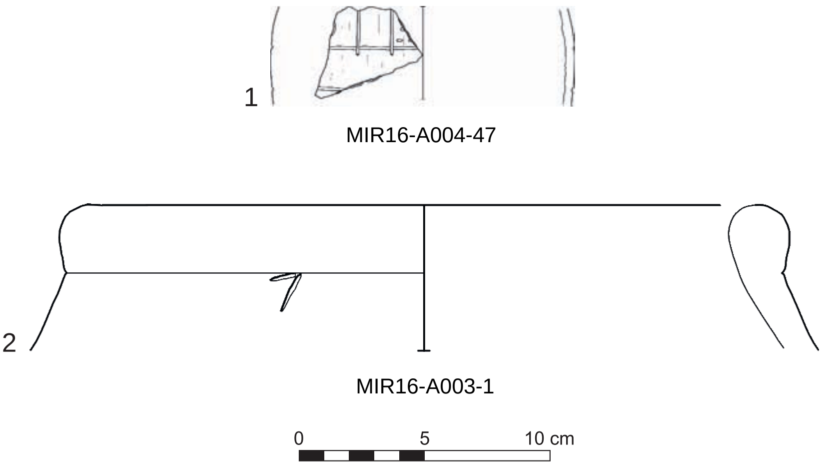


Fig. 15 Tell el-Yahudiyah juglet and Marl C-2 Zir from the rampart fill

foundation of the city wall. This cutting of the upper part of the rampart is also visible in the layers, which must have originally reached nearly double the height of the still preserved core wall (today about 5 m above ground level).

City walls with stone foundations and mudbrick defence walls were very common during the MB in the northern and the southern Levant. According to Aaron Burke, this construction technique of a planned defence system with a central core wall and revetment walls became more standardized from the MB II period onwards.[34] This would fit with the pottery material that has been retrieved so far from the layers of the rampart, which dates most likely to the MB I (=MB IIA) period, with the latest pieces from the end of the MB I to the transitional MB I/II (=MB IIA/B). Among this material were fragments of Levantine Painted Ware, an early Tell el-Yahudiyah juglet (Fig. 15/1)[35] and Egyptian 12th Dynasty pottery (Fig. 15/2).[36]

There is an ongoing discussion about the time and manpower that went into the construction of such ramparts. The estimations for the number of workmen and amount of time needed for such an endeavour varies, of course, according to the size of the cities and the materials used. It is known that the fortified settlements in Mesopotamia and the Northern Levant were much larger than in the Southern Levant. There are several reasons for this phenomenon. One might be different political structures in the north than in the south and another more decisive aspect was most probably the geography of the various regions. While in the north, the large cities of the Bronze Ages, such as Qatna or Ebla, had enough space to expand and their hinterland included vast arable land that could provide for a large number of people, the situation is quite different in the Southern and Central Levant, especially along the Lebanese coast. Arable land is scarce here and, as in the case of Tell Mirhan, the coastal strip could not provide food in unlimited quantities, thus, naturally restricting the number of inhabitants in an area. As opposed to Egypt or the Mesopotamian regions, where there were large states with central administrations, the political system on the Levantine coast was organised differently. We know from the Amarna texts that some of the powerful cities, such as Byblos or Sidon, controlled larger areas. During the LB, for example, Byblos' political area of influence reached at least to Tell Kazel in the Akkar plain, some 100 km north of it. Texts



Fig. 16 Microstatigraphical sampling of the rampart layers (©OREA & AUB, photo M. Börner)

34 Burke 2008, 54.

35 This juglet belongs to the group piriform 1b, after Bietak 1986, 346; see also Aston and Bietak 2012, 144–152, group I.2.

36 The zir belongs to rim type 2, see Kopetzky 2010, 163–164.

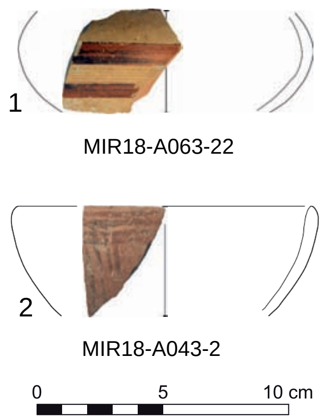


Fig. 17 Mycenaean stirrup jar and White Slip II-III milk bowl from Iron Age pits

from the second half of the third millennium in Ur are dealing with large construction projects in Mesopotamia that were organised by a central administration and required a large number of specialists and corveé workers.[37] These large building projects are the models on which the calculations for the constructions of the ramparts in the Levant are based.[38] Depending on the calculation of various scholars, such constructions should have been completed between a period of a few months up to ten years.

The structure of the fortification of Tell Mirhan shows clearly in its construction technique and in the material chosen for the individual layers of the rampart that the planning and overseeing of the building was done by specialists.

Within the framework of this project, we intend to investigate from where the construction material was brought to the site. Microstratigraphical samples were taken during the 2018 excavation season by the University of Reading (Fig. 16), which will help to determine not only the composition of the various layers of the rampart and their treatments, but also how long the construction of this fortification might have taken.

As mentioned above, during the LB, the site of Tell Mirhan might be identified with ancient Šigata, known from the Armara letters, where it was mentioned several times during a conflict which the then ruler of Byblos Rib-Hadda had with ^{c}Abdi-Aširta of Amurru.[39] These letters describe the turbulent history of the Northern Levant during that period and the changes of loyalties in the region. According to these letters, Šigata was initially under the rule of Byblos, which itself was a vassal of Egypt. Most of the time, the letters mention the city together with Ampi (possibly modern Enfeh, 3 km north of Tell Mirhan). ^{c}Abdi-Aširta first conquered Irqata (probably Tell Arqa), then Ardata (modern Arde) was lost to Byblos and finally, Šigata and Ampi were taken. Subsequently, Batruna (modern Batroun) and Ullaza (probably Tripoli) were seized and, after a long resistance, Sumur (probably Tell Kazel) changed sides. These events happened all within a radius of 60 km of Tell Mirhan.

These letters inform us indirectly that the city of Šigata was fortified during the Amarna period.[40] Rib-Hadda's demand for horses to be sent from Egypt to defend Šigata indicates that the area around this city allowed the use of chariots in warfare. If the identification of Tell Mirhan with Šigata proves to be correct, then this would imply that this part of the Levantine coast was largely free of marshes.

There is evidence of a LB occupation on Tell Mirhan. One occasionally finds Mycenaean imports (Fig. 17/1),[41] Late Cypriot Monochrome, Base Ring II and White Slip II-III wares (Fig. 17/2)[42] on the surface and in IA pits. However, no archaeological layers of this period have been detected so far.

Excavations on Tell Mirhan:

Participants of the season 2018 (23 May–6 July 2018)

Prof. Hermann Genz – project and field director (AUB)
Dr. Karin Kopetzky – project and field director, ceramic specialist (OREA)
Rowena Banerjea, PhD − micromorphologist
Dipl. Ing. Mario Börner – excavation technician, surveyor (OREA)
Veronika Giesser, BA – archaeologist

[37] Steinkeller 2015, 9.
[38] Burke 2008, 143−158.
[39] Moran 1992, EA 71:25,30, EA 74:24, EA 76:18, EA 88:7, EA 90:9, EA 95:44, EA 98:11,16, EA 104:12, 41.
[40] In EA 71:27, archers are requested besides chariots and foot soldiers.
[41] According to R. Jung, who is going to study the Mycenaean pottery from Tell Mirhan, this piece dates to the LH IIIB early-middle period, FT 178/180, after Furumark 1992, pls. 103/178, 104/180.
[42] See Eriksson 2007, 150−153.

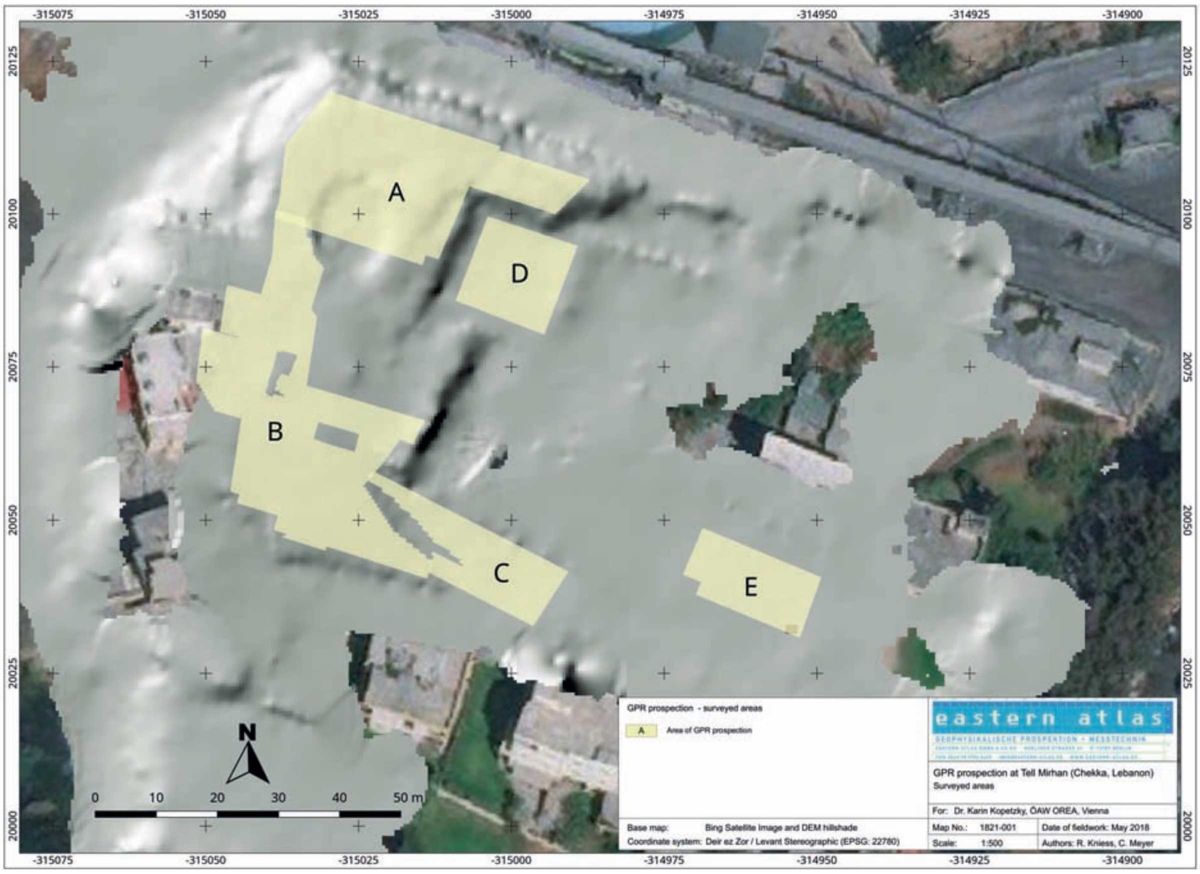


Fig. 18 Geophysical prospection areas at Tell Mirhan (©OREA, AUB & Eastern Atlas)



Fig. 19 Rudolf Kniess from Eastern Atlas measuring in Area B (©OREA, AUB & Eastern Atlas)

Daniel Hofmann – student
Mag. Rudolf Kniess – geophysicist
Mahmoud Mardini, MA – archaeologist,
Nikolaas Noorda, MA – archaeologist
Julian Posch, BA – archaeologist (OREA)
Molly Reeder – student
Ed Schlothauer – volunteer
Dr. Christoph Schwall – archaeologist (OREA)

Geophysical survey

Shortly before the excavations began, we conducted a geophysical survey on the remaining tell and at its base to get an idea about the extension of the archaeological remains (Fig. 18). Since the area has been used as a dumping place and construction site in the recent past, a lot of metal scraps are lying around. Therefore, the only possibility was the use of ground-penetrating radar to localize ancient structures. Beside the area south of the large E–W cut (area A) where the excavation will take place, the adjacent area B was measured; this area borders modern houses and is covered with concrete in large parts (Fig. 19). Area C slopes to the, nowadays, lower part at the south-east of the site, while areas D and E were both dug up nearly to the bedrock in the recent past and we wanted to check whether any archaeology has survived in these areas. A total area of more than 3,000 m² was investigated with ground-penetrating radar. Unfortunately, the results were not satisfying. None of the ancient walls, which were clearly visible in the section of the long E–W cut, showed up in the radar images. Only modern constructions, such as underground piping and wiring, and construction debris were testimonies of the alterations of the site in the last 50 years. The results also showed that the areas D and E were levelled down

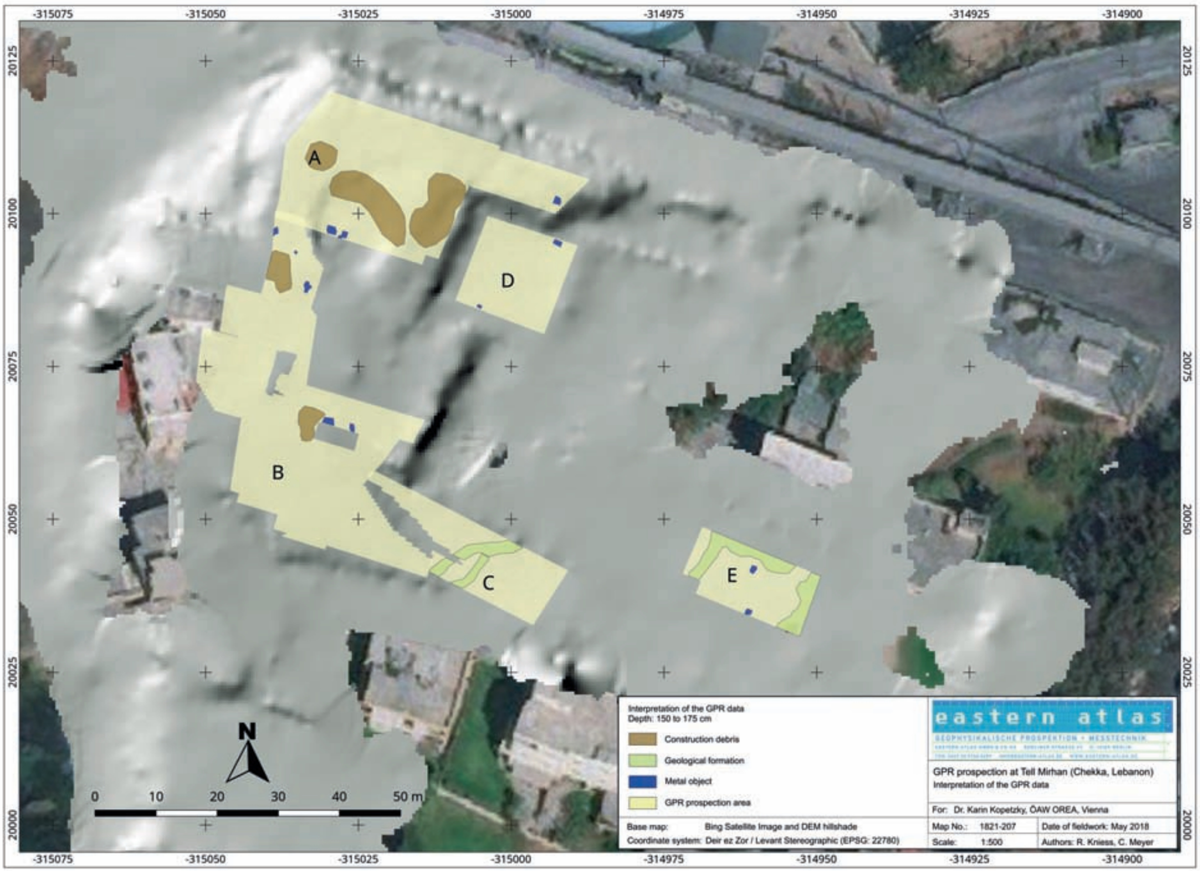


Fig. 20 Geo-radar image showing the measurement results in a depth between 150 to 175cm (©OREA, AUB & Eastern Atlas)

to bedrock and all archaeological features have disappeared in these areas.

A distinctive circular depression of about 12 m in diameter and about 50 cm lower than the surrounding surface is at the southern end of area A. We hoped to gain some understanding of this feature from the ground-penetrating radar, but, again, nothing showed up in the radar images (Fig. 20). However, this depression might be the remains of military activities at the end of the last century. We learned from the local population that the area was fiercely contested during the civil war.

We learned only in 2019 that the road leading to the harbour had been extended to three times its original size in the late 1990s and the material excavated was dumped on top of the tell to a thickness of more than 2 m in some places. This also explained why we found only MB and IA pottery on top of the tell and hardly any recent material.

Three areas were chosen to investigate the following points in the next excavation season. The first was to follow the course of the MB fortification wall and to check whether, contrary to what we expected, any MB layers were still preserved to the east of it. The second area was at the northwestern corner of area A next to the large E–W cut, where stone walls had already been observed during our 2016 survey. Finally, one square was opened in the circular depression mentioned above to investigate its nature.

Area A/I–b/33, c/33 and f/32 (Fig. 21)

This area lies in the middle of the remaining tell and encompasses the core wall of the MB fortification and the adjacent layers to the east. It is evident from the section that the core wall is North-South orientated in this area and that the layers running up to its eastern facade must have been inside the city. The idea is to understand the construction of this earthwork, the material used for it and the time it took to construct it (see above).

We encountered a very compact, hard and dark grey layer of soil (context 302/501) directly under the surface, which contained a mixture of MB and IA pottery (Fig. 22). Fragments of modern material showed up at its base. It soon became clear that this, more than 1-m-thick layer, was dumped on the ancient surface of the tell not long ago and came from the widening of the adjacent road lead-



Fig. 21 Map of the remaining archaeological areas of Tell Mirhan (©OREA & AUB, graphic M. Börner)

ing to the harbour. We discovered a pit at the western sections of squares b/33–c/33, which turned out to be a trench (context 306) caused by stone robbing of the core wall (context 307/502) of the fortification system, under which the eastern edge of the core wall came to light. Layers of the inner rampart fills are attaching this wall. Running up to the eastern side of the wall are contexts 305/503 and, next to it, contexts 304/504, two of the layers of the rampart system that supported and protected the fortification wall.

In search of the continuation of the fortification wall to the south, we opened square f/32. It is located at the centre of the remaining tell, inside the circular depression mentioned above. The hard and compact layer, which covered the wall in the north, is missing in this area. In the middle of the square, an approximately 1-m-wide trench cuts deep into it, running in a North-South direction. The material retrieved from this trench (context 1103) is a mixture of MB and IA pottery. A stone setting appeared at the base of this trench (context 1114) which might be the continuation of the core wall of the fortification.

It is clear from the large E−W section that the main part of the still existing MB layers of the tell consists of the rampart fortification. For the time being, it is still unclear whether MB habitation layers are still preserved inside the fortification system. This will be determined in next year's excavation season. As mentioned above, the pottery coming from the various layers of the rampart hints at a construction date towards the end of the MB I and the transitional MB I/II periods. The large number of imported vessels from Egypt dating to the same period indicates the importance of this site in the Mediterranean trade during the Middle Kingdom.

Area A/I–b/29–30 and c/30 (Fig. 21)

A second area was opened at the north-western edge of the tell and next to the large E−W cut, which lies outside the MB fortification where several walls are visible in the section. The same compact, hard and dark grey layer of soil (context 702) that covered the fortification wall is attested here. Two parallel North-South running walls



Fig. 22 The core wall 307/502 of the MB fortification system (©OREA & AUB, photo M. Börner)



Fig. 23 Iron Age building to the west of the MB fortification in the squares b/29-30 and c/30 (©OREA & AUB, photo M. Börner)

were exposed beneath this layer (walls 704 and 705/112) (Fig. 23), with the remains of a possible floor consisting of flat stone slabs (context 703) east of wall 704. The walls are made from local beach rock and larger limestone boulders and built of nicely cut ashlars set in between sections constructed of smaller undressed stones. These two parallel walls were connected by a perpendicular wall (711) in the north of which only a few stones were still *in situ* along the large E–W section. In the south, another wall (707) closed this area into a nearly square room or courtyard. The western end of wall (707) was destroyed by a large pit (context 113), that cuts into the southern part of the exca-

vated area. An older cobbled floor (context 709) was exposed below the stone paving (703), which continues south of wall (707). Wall (705) continues towards the east (= wall 710) and runs into the baulk. It divides two spaces where the floor levels have not yet been reached. Remains of a possible parallel third wall or stone paving are visible (context 706) west of wall (704).

The pottery collected from these layers dates to the IA II period and contains imports from Egypt, Cyprus and Greece[43] in addition to local material.

A LiDAR survey of the Chekka Region
(5−8 November 2018)

As mentioned above, Tell Mirhan is situated in a very narrow coastal strip, behind which the foothills of Mount Lebanon rise steeply to the plateau of Amioun and Koura. These foothills are rugged and covered with maquis. Due to the difficult terrain and dense vegetation and the speed with which olive plantations and houses are constructed in the survey area, we decided to scan the whole area (Fig. 24) with airborne light detection and ranging equipment (LiDAR). This technique is currently the most detailed and accurate method of creating digital elevation models (DEM) and digital surface models (DSM). The major advantages of this technique are, on the one hand, the ability to filter out reflections of vegetation from a point cloud model to create a digital terrain model, showing the ground surface of the area scanned, including rivers, paths and archaeological structures. Airborne LiDAR digital elevation models allow us to "see" through the canopy of vegetation. On the other hand, this method allows us to obtain detailed information about the structure of the surface within a short time.

In co-operation with the Institute for Physical Geography from the Catholic University of Eichstätt-Ingolstadt in Germany and the Lebanese Air Force, a large part of the survey area (almost 500 km²) was scanned with a RIEGL VP1 laser scanning device mounted on a helicopter. The acquisition of the data was rather difficult in some areas due to local dips in the GPS signal, which made the post-processing more problematic. However, with the help of differential Global Positioning

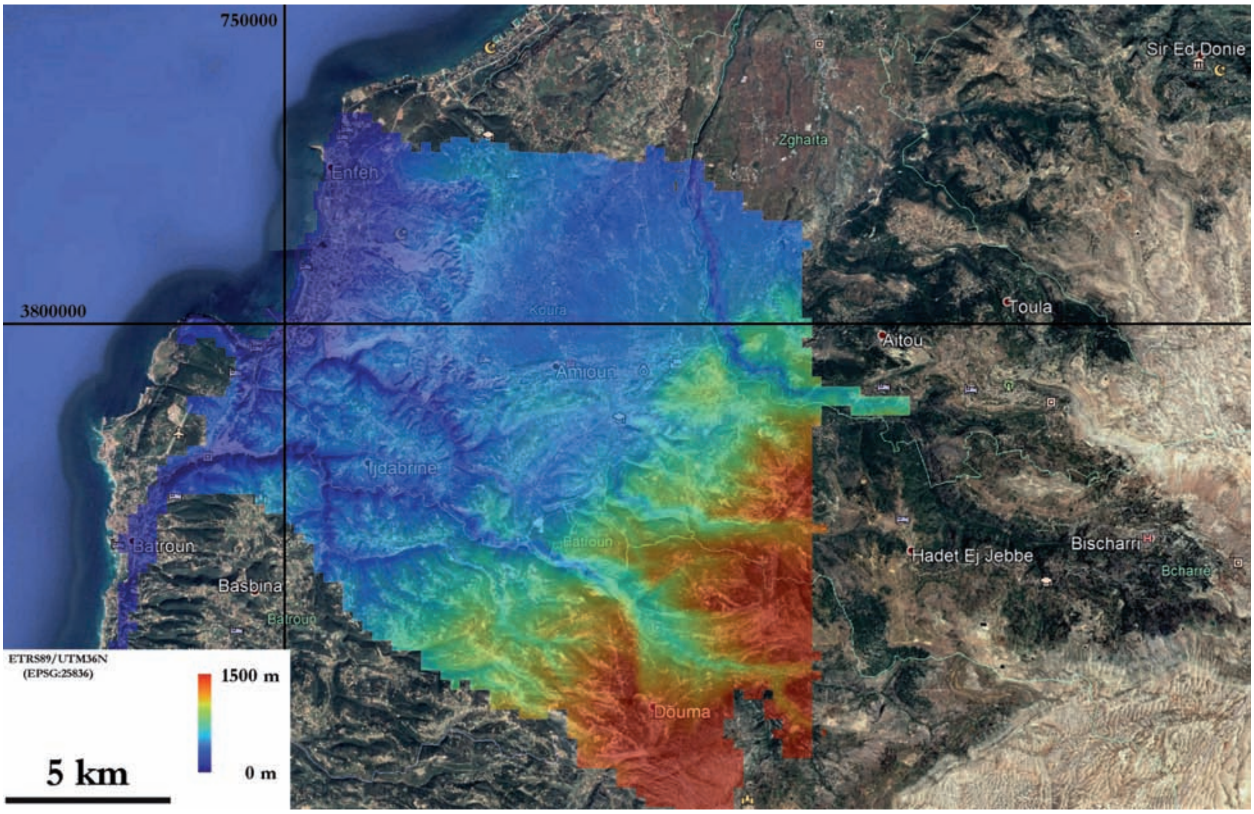


Fig. 24 Area scanned during the LiDAR survey in the autumn of 2018 (©OREA, AUB & University Eichstätt-Ingolstadt)

43 The imports from Greece will be studied by Stephanos Gimatzidis.

System (dGPS) reference points, which were collected on site parallel to the LiDAR survey, the raw data could be processed into a point cloud at the University of Eichstätt-Ingolstadt and the Technical University Vienna. An automated workflow was created using the SAGA LIS software package, mainly on a morphological basis, in order to classify these points and distinguish between ground and vegetation. In a first step, all ground points were selected by an iterative triangulated irregular network (TIN) meshing, followed by a classification of building and vegetation points, divided into low vegetation (< 0.3 m), medium vegetation (0.3–2 m) and high vegetation (> 2 m). Strongly weathered limestone formations in the study area caused minor problems, when they were wrongly identified as vegetation. However, such errors can be minimized with the help of further parameters and manual controls and corrections. A fully classified point cloud allowed us to create a digital elevation model and, thus, to represent the earth's surface with filtered vegetation.

In the current geoarchaeological evaluation of the data generated, various methods are used to detect previously unknown sites. Least cost path analyses can be used to reconstruct prehistoric transport routes from the coast to the mountains.[44] In multi-criteria analyses, both morphological factors, for example, slope inclination, and geographical factors, for example, the distance to running water or the distance to (trade) paths, are used to digitise favoured areas for possible settlements.

If these two approaches result in special areas of interest, these will be examined more closely using different visualization methods. Various optical methods, such as hillshading, local relief models, Sky-View Factor and positive or negative openness,[45] could provide information about ancient remains which have influenced the earth's surface by a few centimetres until today and can, thus, be detected by the LiDAR methodology used here. From these investigations, we hope to identify new sites and draw conclusions about the Bronze and IA exchanges between the coastal region and the mountains in present-day Lebanon.

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44 Zakšek et al. 2008.

45 For literature, see Hesse 2010; Kokalj et al. 2011; Štular et al. 2012; Doneus 2013.

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